

Appendix I

Terms of Reference

TERMS OF REFERENCE

SAFETY AUDIT OF TRAFFIC CONTROL AT ROADWORK SITES 97/98

1. Introduction

This is unprogrammed piece of work. There is no provision in the Transfund New Zealand's Review and Audit Division's 1997/98 Business Plan. It follows on from a pilot audit undertaken in 96/97. It is proposed to conduct two further audits, one in the North Island and the other in the South Island.

2. Background

2.1 Capital Training

In 1996, Messrs Mike Gray and David Parkes of Capital Training Ltd., approached Transfund New Zealand. They run training courses on traffic control at roadwork sites. Their concern was that the standards they taught, which were required by construction contracts were not being achieved in practice.

With the support of Stuart Fraser, Transit's Training and Education Manager, a pilot audit was conducted in January 1997. (Review and Audit Division Report no. RA96/562S). That pilot audit found that not one of the 15 sites observed on both state highways and local authority roads met the standards for basic safety and legal requirements for sign use.

2.2 Land Transport Safety Authority (LTSA)

Each year the LTSA conducts what it calls "Theme Audits". In these audits a particular standard or guideline is chosen, and a snapshot of the national compliance with it is obtained. The LTSA develop a simple questionnaire, which is sent to a sample of 30 road controlling authorities (RCAs). This is followed by a personal visit from an LTSA engineer, who discusses and completes the questionnaire with the RCA representative. Together they inspect sites to determine compliance with the standard or guideline.

This year the LTSA have chosen to look at the standards and guidelines for traffic control and especially the setting of speed limits at roadwork sites. The fact that the questionnaire is sent to the RCAs in advance of the site visits may influence the contractors' performance.

2.3 Complimentary Plan

The plan is to treat this proposal for audits of roadwork sites and the LTSA survey as complimentary exercises. This proposal will concentrate on achieving an "unannounced" result while the LTSA will concentrate on the standards adopted by RCAs and the processes they have in place to ensure compliance with the standards.

There is no intention to try and match the routes selected for the Transfund audits with the 30 RCAs in the LTSA sample.

3. Draft Procedures

Review and Audit Division Report no. RA96/562S describes the draft procedures developed by Messrs. Gray and Parkes. The report includes a rating system called "Site Danger Factor" which was developed by Capital Training. The formula is used to give an objective, numerical assessment of the potential dangers at each worksite.

4. Purposes of the two safety audits of traffic control at roadwork sites.

The purposes of these audits are:

- To report to the Transfund New Zealand Board on the provision for road safety at roadwork sites;
- To apply Capital Training's draft procedures so that they may be developed further, possibly for use as an operational tool by road controlling authorities;
- To provide an element of training on the job for team members; and
- To provide a complimentary audit to the LTSA audit.

The pilot audit already undertaken, and these two further audits may lead the way to regular audits of roadwork sites.

5. Sponsor

Peter Wright, Transfund New Zealand Review and Audit Manager

6. Project Manager

Ian Appleton, Transfund New Zealand Safety Audit Manager

7. Scope

These terms of reference are for two safety audits of traffic control of roadwork sites to be conducted in 97/98. The audits will not be unannounced in advance. One will be in the North Island and the other in the South Island. They will cover both state highways and local roads in both urban and rural areas. Observations will be made both during working hours and outside working hours.

7.1 Audit teams

There will be two separate audit teams. Each team shall consist of four persons:

- Team Leader;
- Advisor;
- The Project Manager; and
- Fourth team member.

The *Team Leaders* will be John Boyson (John Boyson Consulting Services) for the North Island audit and Jeff Kaye (Opus International Consultants Ltd) for the South Island audit. Both have experience in conducting training courses for traffic control at roadwork sites.

The *Advisor or second team member* will be one of Mike Gray or David Parkes. Capital Training were the initiators for the pilot audit and developed the draft procedures to date. They will advise on the methodology, provide continuity from the pilot audit to these audits, and give an element of training on the job for other team members.

The *third team member* will be the *project manager* who will act as the driver and take the road user's perspective. He is not familiar with the details of the standards of traffic control that should be applied.

The *fourth team member* will be an invited person. Ideally this person should be a member of the LTSA who will be involved in administering their audit.

Each team member will be involved in making observations and recording them.

7.2 Road Controlling Authorities to be covered

These will not be specified in these terms of reference. One of the team leaders' tasks is to devise an itinerary so that the route covers both state highways and local roads, both urban and rural areas, and to observe sites

both during working hours and outside working hours.

7.3 Timing

The fieldwork for each audit will take two days. It should be undertaken in February 1998 or early in March 1998 at the latest.

7.4 Procedures

The audits will follow the methodology in Review and Audit Division Report no. RA96/562S, as far as that is possible. Revisions may be suggested in the light of experience gained.

Each audit shall comprise:

- Briefing
- Audit inspections
- Report drafting
- Final Meeting.

The team will assemble on the evening before the audit for an initial *briefing* on the procedures and tour details.

The process for *audit inspections* will be to seek sites at random. Once a site has been located, the procedure in report no. RA96/562S will be followed. One departure will be that these inspections will be by drive by inspections only. No attempt will be made to stop and/or discuss site situations with the personnel involved.

In the event that a situation is encountered which is considered so dangerous that immediate action is vital, a phone call to the relevant authority will be made to satisfy any obligations under the Health and Safety in Employment Act 1992.

The *Report Drafting* and the *Final Meeting* are covered in the next section of these terms of reference.

8. Intended Output

For each audit, the intended output is a report. The report shall be in two parts:

- A general overview of RCAs' road safety provisions in terms of level of service and hazard management of worksites; and

- An appendix describing each site audited.

The *general overview* may be submitted to the Transfund Board subject to the approval of the Review and Audit Manager and the Chief Executive of Transfund.

The *appendix* shall compare the standards that the auditors believe should have been in place with what was observed to be in place. Each site shall be rated according to Capital Training's "Site Danger Factor". Compliance / non compliance shall be detailed.

The team leader shall be responsible for writing the report. The preliminary draft of the report shall be prepared within 28 days of the completion of the fieldwork. The preliminary draft shall be sent to the team members for their comment. A draft report shall be prepared taking these comments into account.

The team leader shall send the details of each site to the appropriate RCAs for comment. A traffic management plan can be requested at that time.

After the completion of the draft report and receipt of the RCAs' comments, the audit team shall assemble for a *Final or Exit Meeting* to discuss the draft report and agree on the shape and content of the final report. Representatives of the RCAs' asset management could be invited to this exit meeting.

Based on the findings of the report, recommendations could be made on:

- areas requiring further attention such as significant areas of general non-compliance;
- areas where standards and/or legislation require modification;
- the need for further audits and the form they should take; and
- the development and publication of the audit procedures.

9. Tasks

9.1 Project Manager (Dr Appleton)

- Appoint the team leaders;
- Agree with other team members the timing of the audits;
- Liaise with the LTSA;
- Organise the rental car;
- Provide resources (refer paragraph 12)
- Lead the briefing session;
- Act as the driver during the audit;

- Provide comment on the team leaders' preliminary draft reports;
- Chair the Exit meetings;
- Receive the final reports and prepare them for submission to the Transfund Board, if deemed appropriate;
- Convey the Board's resolutions, as appropriate;

9.2 Team Leaders (Messrs Boyson & Kaye)

- In consultation with the project manager, select and invite the other members of the teams;
- In consultation with team members, decide on dates for the audit;
- Plan and organise details of the audits, including the route to be followed, travel and accommodation arrangements and equipment needs;
- Act as the team leader during the audit inspections;
- Compile notes during and after the audit to facilitate the writing of the draft report;
- Prepare the preliminary draft and submit to other team members for comment;
- Prepare the draft report, taking team members' comments into account;
- Seek comment from RCAs on the part of the draft report on the sites seen on their roads;
- Organise the exit meeting including a possible invitation RCAs' Asset Managers;
- Lead the exit meetings;
- Prepare the final report, taking into account Transfund's and the RCAs' Asset Managers' comments into account.

9.3 Second team members – the Advisors

- Participate in the audit and provide advice on the procedures;
- Assist with observations, recording of observations;
- Assist in the preparation of notes for the draft report;
- Provide comment on the preliminary draft report;
- Attend the exit meeting to assist in the completion of the final report.

9.4 Fourth team member

Ideally this should be a member of the LTSA who will be involved in the LTSA "Theme Audit" refer paragraph 2.2, to provide a continuity from the Transfund audit to the LTSA audit.

The Fourth team member shall undertake tasks similar to the advisors (paragraph 9.3) with the exception of providing advice on the procedures.

10. Timeframes

The timing of the individual audits depends on the commitments of the team members. However the fieldwork for two should be completed in February 1998 or early March 1998 at the latest.

An indicative timeframe for the other phases is:

- Preliminary draft report available after 28 days of the completion of the fieldwork;
- Comments from RCAs required by 30 April 1998;
- Exit meeting in May 1998.

11. Ownership of results

The pilot safety audit method used and developed through these audits shall be the property of Transfund New Zealand, but Transfund New Zealand will ensure that the method will be freely available for anyone to use. Transfund will acknowledge that Messrs Gray and Parkes of Capital Training Ltd undertook the initial development work on these procedures.

12. Resources

The project manager shall provide for the following:

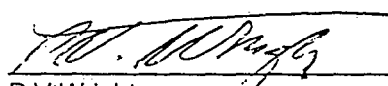
- Fees and expenses for the team leaders and advisors;
- Hire of meeting rooms and rental cars as needs be;
- Costs of photographs, photocopying and the production of the reports;

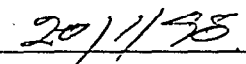
13. Budget

It is estimated that each audit will cost about \$10,000 excluding GST.

14. Approval

Terms of Reference approved:


P V Wright
Review and Audit Manager


Date

Appendix II

Example Survey Forms

Site No.

SKETCH / DIAGRAM OF ACTUAL WORK SITE

**SAFETY AUDIT - TRAFFIC CONTROL AT ROADWORKS SITES
NORTH AUCKLAND AND NORTHLAND**

Site No.:
Recorded By:
Date:
Approx. Time:
Location of Site:

Description of Work Type:
Road Controlling Authority:
Name of Contractor:

Prompts Y/N = Yes/No
A-S-N = All-Some-None

< Signage:

Comments:

- Visibility A-S-N.....
- Placement A-S-N.....
- Height A-S-N.....
- Size A-S-N.....
- Quality A-S-N.....
- Acceptance A-S-N.....
- Marginal A-S-N.....
- Unacceptable A-S-N.....

< Delineation

- Cones A-S-N.....
- Drums A-S-N.....
- Barricades A-S-N.....
- Other A-S-N.....

< Protection

- Excavations Y/N
- Pedestrians from work Y/N
- Pedestrians from traffic Y/N
- Cyclists from work Y/N
- Cyclists from traffic Y/N

< Worksite Zone/Hazard Area

- Safety space A-S-N
- Vehicle hazard lights A-S-N
- Vehicles operating with traffic flow A-S-N
- Vehicles parked with traffic flow A-S-N
- Vehicles outside zone A-S-N
- Entering/leaving with traffic flow A-S-N
- Workers safety A-S-N
- Site supervisor/traffic controller Y/N A-S-N.....

<Principal Zones Correct

- Advance warning Y/N
- Direction Y/N
- Protection Y/N
- End of works Y/N

Site Danger Factor:

SAFETY AUDIT - TRAFFIC CONTROL AT ROADWORKS SITES - NORTHERN CANTERBURY

SITE DANGER ESTIMATION FORMULA

SITE PROTECTION FACTORS = P

- 50 = All signs missing.
- 10 = Deficiencies in:
- Sign visibility distance
 - Sign warning distance
 - Sign spacing
 - Cone Taper
 - Cone spacings
 - Traffic protection inadequate
 - Pedestrian/cyclist protection inadequate
 - Worker protection inadequate
 - Wrong sign used dangerously
 - Working outside safety space - (workers/equipment)
 - Safety vests/PPE not used/ineffective
 - No intersections signed
 - TW-30 missing for stop/go control
 - TW-24 used in 2 lane, 2 way road
 - Flashing lights not used/ineffective
 - Signs not safely visible at night
- 5 = Some signs omitted
- Some intersections not signed
 - Wrong signs used - not dangerous
 - Sign sequence wrong
 - Signs not legal
 - Sign quality unacceptable
 - Permanent signs not covered
 - Some flashing lights not used/working
- 2 = Some signs wrong:
- Size
 - Height
 - Grade
 - Sign quality marginal

ADD MULTIPLE DEFICIENCIES FOR P

KEY:

ADD ALL SITE PROTECTION FACTORS FOR VALUE = P

SELECT SITE COMPLEXITY FACTOR FROM PARAMETERS LISTED = C

SELECT TRAFFIC EFFECT FACTOR FROM CONTROL METHOD OBSERVED = T

MULTIPLY P----- x C----- x T-----

= SITE DANGER FACTOR -----

SITE COMPLEXITY FACTORS = C

- 1 = SIMPLE No intersections,
2 lane-2 way, 1 way,
50 km/hr
low volume traffic
- 5 = MODERATE Intersections/roundabouts
2 lane-2 way, 1 way
50/70 km/hr
medium volume traffic
- 10 = COMPLEX Intersections/roundabouts
2 lane-2 way or multi lane
80-100 km/hr
High volume traffic



















TRAFFIC EFFECT FACTORS = T

- 1 = Works not in carriageway
- 5 = Traffic staying in own lane
- 10 = Traffic moving from own lane - signed
- 20 = 1 Lane created - No signs
1 Lane, 2 way traffic created with no
TW-27sign combined with RG-19 and
RG-20 signs.
No temporary lanes
No traffic controller.

Appendix III

Example Survey Results and Drawings

Ke

Working Area	
Safety Zone	
Excavated Area or Drop Below Road Level	
Cone	
Edge Marker Post	
Steel 44 Gallon Drum	
Orange Plastic Mesh Fence	
Position of Object Identified on Drawing	
Concrete Barrier Unit	
Site Vehicle	
Site Vehicle Operating Orange Flashing Light	
Other Vehicle	
Trench Crossing	
Footpath	
White Sight Rail	
Road being worked on/ detail drawings cover	
Other Road	
Location of Spot Detail Plan	

Note on System of Measurements Used on Drawings

Distances are measured in whole metres, in both directions, away from a known benchmark identified as the zero point.

These are usually the start of the working area, the first sign encountered or in some cases another physical feature identified on the drawing.

In some cases two separate measuring systems are adopted, usually from either end of the working area. Where this occurs the second numbering system is denoted in red.

Note on Scale of Drawings

Whilst the lengths are generally to 'scale' and the curves reflect the direction the road takes, the alignment depicted may not exactly match the alignment of the road in reality.

Orientation

Plans are orientated so that North is generally to the top of the page.

Transfund New Zealand

1998 Road Works Traffic Control Audit

Site No.	Site Location	Notes to Drawings

South Island Site in 'Marginal' Condition

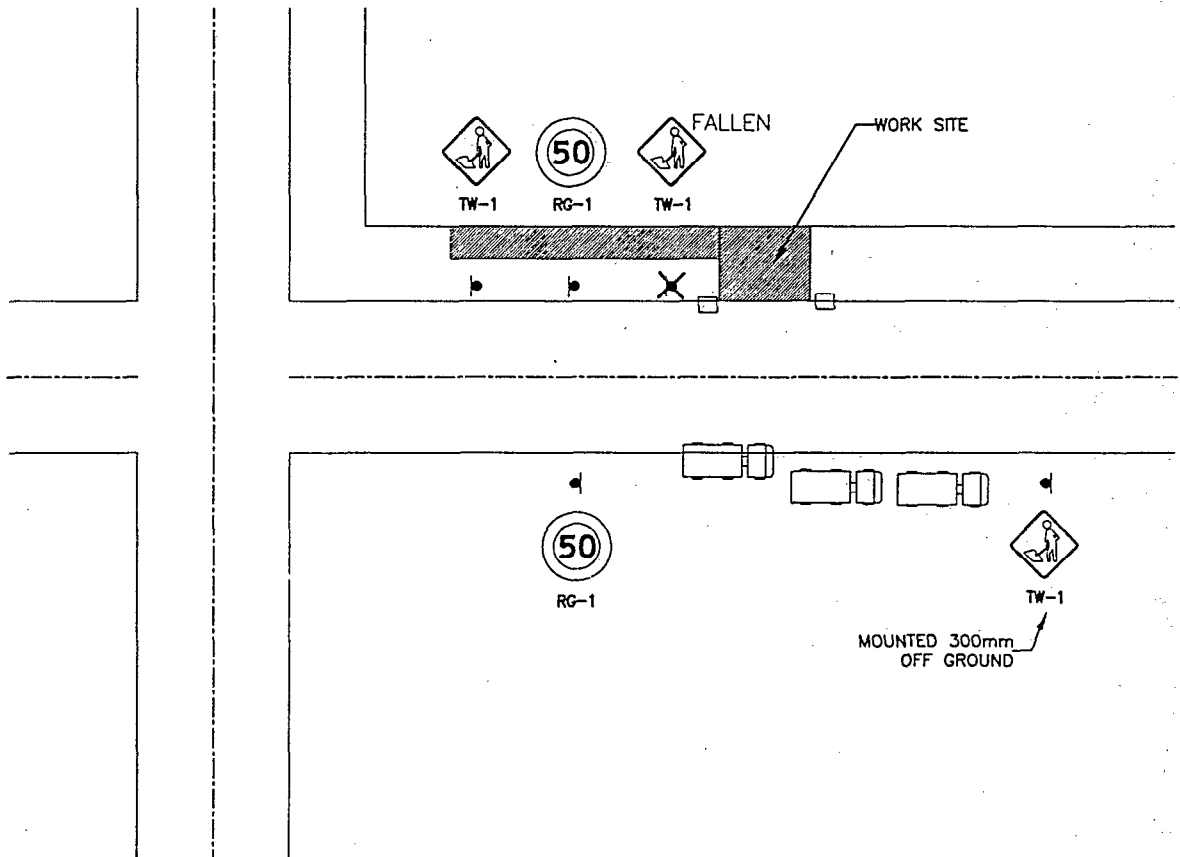
2.26 Site 26

- Location -
- RCA -
- Contractor -
- Type of Work - Driveway and drainage construction southern grass shoulder.

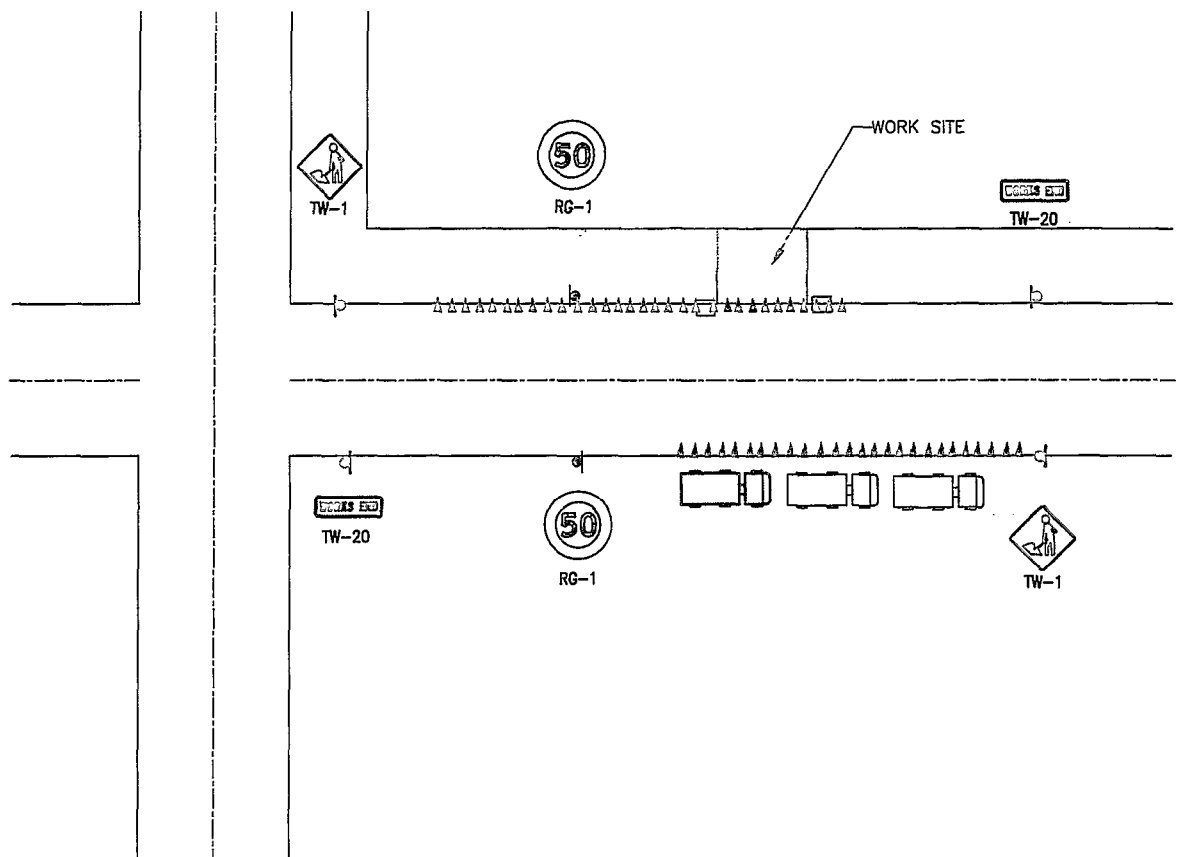
TW-1 "Roadworks" sign erected for eastbound lane. Sign mounted too low (300 mm above ground).

- No other temporary traffic control signs erected.
- White painted 44 gallon oil drums used to protect excavations.
- Active worksite off road but construction equipment parked on both sides of High Street.
- **Site Danger Factor** 925
- **Recommendations**
 - Review Contractors Traffic Management Plan.
 - Install correct traffic control signs and delineation equipment.
 - Ensure parked construction equipment is at least 5 m back from the edge of seal or if closer located behind a row of cones located on the edge of seal.

SKETCH/DIAGRAM OF ACTUAL WORK SITE



SKETCH/DIAGRAM OF COMPLYING WORK SITE



South Island Site in 'Serious' Condition

2.20 Site 20 - 6.3.98

- Location -
- RCA -
- Contractor -
- Type of Work - Shape correction/roadway reconstruction.

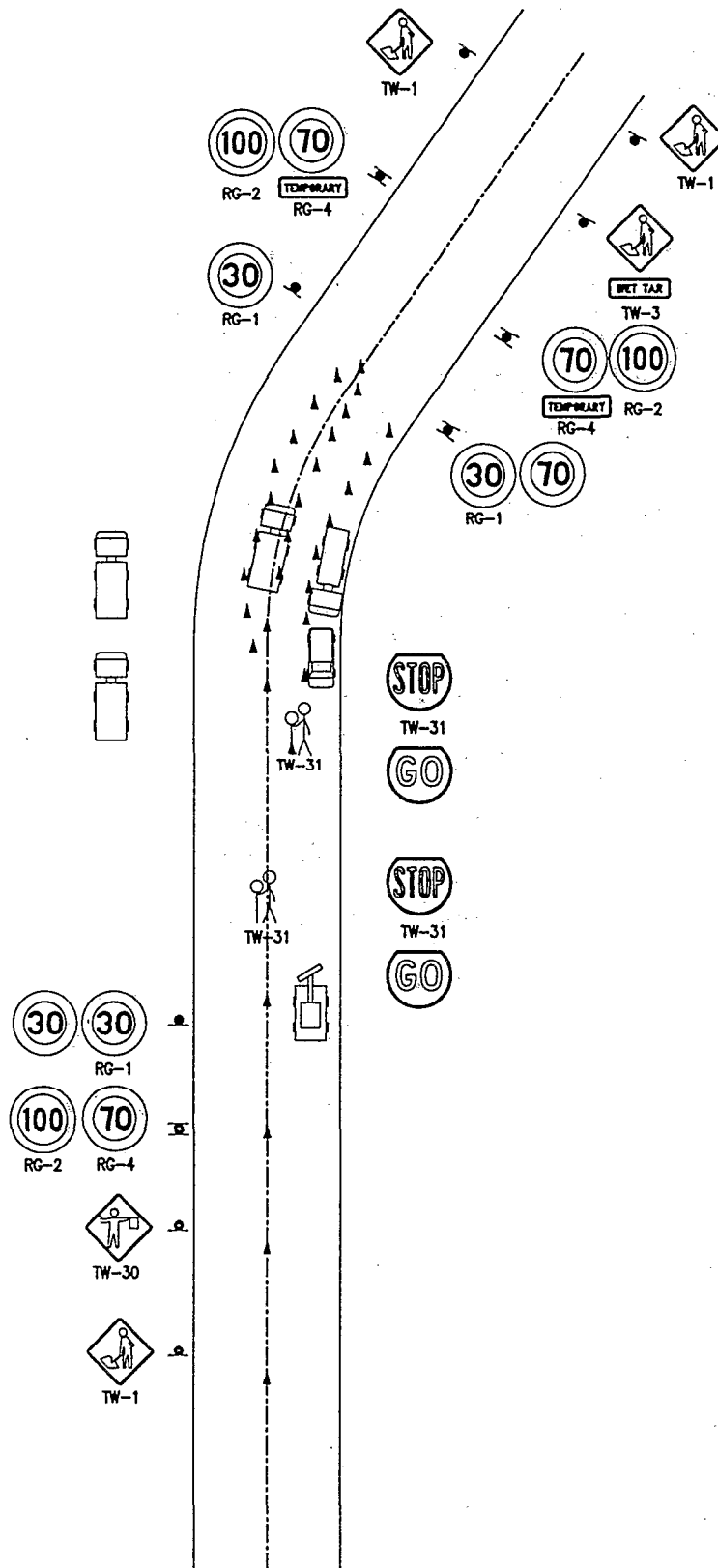
A good worksite, well controlled at the north end. However at the south end there was no separation between the through traffic and the working construction equipment.

Unnecessary transitional speed signage erected at both ends of the site.

No RG-17 "keep left" signs erected at the head of the coned off central worksite area at the north end of the site.

- **Site Danger Factor** 1000
- **Recommendations**
 - Review work practices to ensure that motorists are separated from the construction area with cones/barricades.
 - Check signage and replace transitional speed limit signs with repeater 30 km/hr signs.

SKETCH/DIAGRAM OF ACTUAL WORK SITE



SKETCH/DIAGRAM OF COMPLYING WORK SITE

